

WHAT IS CLAIMED IS:

1 1. A foam composition comprising:

2 a fibrous material including microspheres interspersed
3 within the fibrous material forming a part of the structure of
4 the foam.

5
6 2. A composition comprising:

7 a microsphere component comprising a microsphere selected
8 from the group consisting of a glass, a silica-alumina
9 ceramic, an epoxy resin, an unsaturated polyester resin, a
10 silicone resin, a phenolic, a polyvinyl alcohol, a polyvinyl
11 chloride, a polypropylene, a polystyrene, a polyacrylonitrile,
12 a polyimide, an amino resin, and any combination thereof;
13 and

14 a fibrous component surrounding at least one of said
15 microspheres.

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17 3. The composition of claim 2, wherein the microsphere
18 component comprises a combination of expanded and non-
19 expanded microspheres.

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21 4. The composition of claim 2, wherein the microsphere is a
22 polyacrylonitrile (PAN).

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24 5. The composition of claim 4, wherein the PAN microspheres
25 are a combination of expanded and non-expanded
26 microspheres.

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28 6. The composition of claim 2, wherein the microsphere is a
29 polyvinyl chloride (PVC).

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- 31 7. The composition of claim 2, wherein the fibrous component
32 comprises aramid fibers, carbon fibers, glass fibers, or
33 any combination thereof.
- 34
- 35 8. The composition of claim 2, wherein the composition
36 comprises a fibrous component from about 2-15% by weight.
- 37
- 38 9. The composition of claim 8, wherein the fibrous component
39 comprises about 10% by weight fiber.
- 40
- 41 10. The composition of claim 2, wherein the microsphere
42 component comprises polyacrylonitrile (PAN) and the fiber
43 component comprises polyester fibers, aramid fibers,
44 glass fibers, or a combination thereof.
- 45
- 46 11. The composition of claim 2, wherein the microsphere
47 component comprises polyvinyl chloride (PVC) and the
48 fiber component comprises polyester fibers, aramid
49 fibers, glass fibers, or a combination thereof.
- 50
- 51 12. A fibrous-reinforced foam made by a method comprising:
52 contacting a fibrous material with a microsphere
53 component under conditions such that the microsphere component
54 infiltrates the fibers of the fibrous component to generate a
55 mixture; and
56 heating the mixture under conditions such that the
57 microspheres expand.
- 58
- 59 13. The fibrous-reinforced foam of claim 12, wherein the
60 mixture is expanded by applying a heat to a mold comprising
61 the mixture.
- 62

63 14. The fibrous-reinforced foam of claim 12, wherein the
64 conditions comprise vibrating the mixture.

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66 15. The fibrous-reinforced foam of claim 12, wherein the
67 microsphere component comprises a combination of expanded and
68 non-expanded microspheres.

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70 16. The fibrous-reinforced foam of claim 12, wherein the
71 microsphere component comprises polyacrylonitrile (PAN)
72 microspheres.

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74 17. The fibrous-reinforced foam of claim 16, wherein the PAN
75 microspheres are a combination of expanded and non-expanded
76 microspheres.

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78 18. The fibrous-reinforced foam of claim 12, wherein the
79 microsphere component comprise polyvinyl chloride (PVC)
80 microspheres.

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82 19. The fibrous-reinforced foam of claim 12, wherein the
83 fibrous component comprises aramid and/or glass fibers.

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85 20. The fibrous-reinforced foam of claim 12, wherein the
86 mixture comprises a fibrous component from about 2-15% by
87 weight.

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89 21. The fibrous-reinforced foam of claim 20, wherein the
90 mixture comprises a fibrous component of about 10% by weight.

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92 22. The fibrous-reinforced foam of claim 12, wherein the
93 microsphere component comprises polyacrylonitrile (PAN) and

94 the fiber component comprises polyester fibers, aramid fibers,
95 glass fibers, or a combination thereof.

96

97 23. The fibrous-reinforced foam of claim 12, wherein the
98 microsphere component comprises polyvinyl chloride (PVC) and
99 the fiber component comprises polyester fibers, aramid fibers,
100 glass fibers, or a combination thereof.

101

102 24. A method of making a fibrous-reinforced foam, comprising:
103 mixing a microsphere component with a fiber component in
104 a closed mold;

105 vibrating the closed mold under conditions the cause the
106 microspheres to infiltrate the fibrous matrix of the fiber
107 component;

108 heating the mold to expand the microspheres and fuse them
109 together; and

110 allowing the mixture to cool.